

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **87301891.5**

(51) Int. Cl.⁴: **H02H 3/02 , G21K 1/14 ,
B64G 1/00 , G01N 3/56**

(22) Date of filing: **04.03.87**

(30) Priority: **19.03.86 US 841142**

(43) Date of publication of application:
07.10.87 Bulletin 87/41

(84) Designated Contracting States:
DE FR GB IT

(88) Date of deferred publication of the search report:
05.04.89 Bulletin 89/14

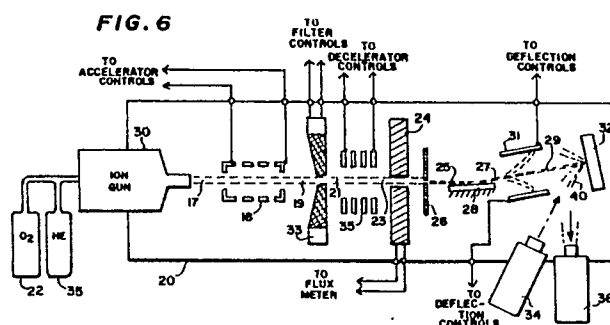
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(54) **Method and apparatus for producing neutral atomic and molecular beams.**

(57) A method and apparatus for producing a neutral beam of oxygen (29) or other gas for use in testing of materials and for heavy particle etching is disclosed. A beam of positively ionized gas (17) is accelerated and filtered to produce a beam (21) having ions of a selected energy. The beam is decelerated to an energy of the level required and directed toward a photo emissive surface (28) at a grazing incidence angle causing electrons to be contributed to the beam thereby neutralizing part of the ionized atoms and molecules of the beam. The neutralized beam (29) is directed through electrostatic deflection plates (31) which separate out remaining ionized particles producing a neutral beam (29).



DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)		
X	JOURNAL OF PHYSICS D. APPLIED PHYSICS, vol. 19, no. 2, February 1986, pages 157-169, Bristol, GB; K. OHYA et al.: "Atomic nitrogen neutral beam produced by dissociation of molecular ions on Cu surface"		H 05 H	3/02	
	* "Introduction" & "Experimental details"; figure 1 *	1,9	G 21 K	1/14	
A	JAPANESE JOURNAL OF APPLIED PHYSICS, vol. 7, no. 8, August 1968, pages 916-926, Tokyo, JP; K. MORITA et al.: "Scattering of low energy hydrogen ions (H_1^+ , H_2^+ and H_3^+) and atoms (H_{1o}) from evaporated metallic films"		B 64 G	1/00	
	* Paragraph 2, "Experimental apparatus and techniques"; figure 1 *	1,9	G 01 N	3/56	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)		
			H 05 H		
			G 21 K		
			B 64 G		
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					
Place of search THE HAGUE		Date of completion of the search 3rd October 1988	Examiner WINKELMAN		
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document					



CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-7: method for producing a beam of neutrals ...
Claims 9-16: apparatus for performing the method of claims 1-7
2. Claim 8: method for analyzing eroding effects of atomic oxygen upon materials ...

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims: 1-7, 9-16